

1 CLAIMS

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3 1. A cylinder head assembly comprising a cylinder
4 head having an inlet passage and an outlet passage
5 for communication, in use, with a cylinder, and at
6 least one rotatably mounted shaft member interposed
7 between the inlet and outlet passages and the
8 cylinder, the shaft member(s) having passage means
9 to allow an ingress of air mixture from the inlet
10 passage to the cylinder at a first desired
11 rotational position, and to allow an egress of
12 combusted gases from the cylinder through the outlet
13 passage at a second desired rotational position and
14 to prevent the air or combusted gases from entering
15 or exiting the cylinder at a third desired
16 rotational position.

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18 2. A cylinder head assembly according to claim 1,
19 in which there are two shaft members, one
20 cooperating with the inlet passage and one with the
21 outlet passage.

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23 3. A cylinder head assembly as claimed in claim 2,
24 in which the shaft members are coupled, in use, to a
25 crankshaft with means for independently controlling
26 or adjusting the speed of rotation of said shaft
27 members.

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29 4. A cylinder head assembly as claimed in claim 2,
30 in which the shaft members are driven independently
31 of the crankshaft, and of each other, with means for

1 individually controlling or adjusting the speed of
2 rotation of said shaft members.

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4 5. A cylinder head assembly according to any
5 preceding claim, in which the shaft member or each
6 shaft member is substantially solid.

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8 6. A cylinder head assembly according to claim 5,
9 in which the passage means comprises a recess in the
10 shaft member or a respective recess in each of the
11 shaft members.

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13 7. A cylinder head assembly according to claim 2,
14 in which each shaft member is hollow; each shaft
15 member having at least one aperture located around a
16 portion of its circumference, wherein the inlet
17 shaft member allows an ingress of air/fuel mixture
18 from the inlet shaft member to enter said cylinder
19 when the aperture in the inlet shaft is presented to
20 the cylinder, and the outlet shaft member allows an
21 egress of combusted gases to exit the cylinder when
22 the aperture in the outlet shaft member is presented
23 to the cylinder.

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25 8. A cylinder head assembly according to claim 7,
26 in which each shaft member is provided with an inner
27 hollow tube member rotatably mounted within said
28 shaft member; each inner tube member having at least
29 one aperture located around a portion of its
30 circumference; rotation of said inner tube member
31 within the respective hollow shaft members providing
32 a variable size effective aperture, which allows a

1 variable ingress of combustion air to enter said
2 cylinder through the effective aperture in the inlet
3 shaft member, and allows a variable egress of
4 combusted gases from the cylinder to exit through
5 the effective aperture in the outlet shaft member.
6

7 9. A cylinder head assembly according to claim 8,
8 in which the speed of rotation of the inner and
9 outer tube members are such that the effective
10 aperture maximises or restricts the rate of ingress
11 of air, or egress of exhaust gases, through the
12 respective inner tube members.
13

14 10. A cylinder head assembly as claimed in claim 8
15 or claim 9, in which the inner tube members are
16 coupled, in use, to a crankshaft with means for
17 independently controlling or adjusting the speed of
18 rotation of said tube members.
19

20 11. A cylinder head assembly as claimed in claim 8
21 or claim 9, in which the tube members are driven
22 independently of the crankshaft, and of each other,
23 with means for individually controlling or adjusting
24 the speed of rotation of said tube members.
25

26 12. A cylinder head assembly according to any
27 preceding claim, in which the shaft member(s) extend
28 over a number of cylinders, the shaft member(s)
29 having a corresponding number of passage means.
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1 13. A cylinder head assembly according to any
2 preceding claim, in which the shaft member(s) have
3 gas tight seal assemblies.
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5 14. A method of allowing an ingress and egress of
6 combustion air and combusted gases from a cylinder
7 comprising the steps of:

8 presenting a passage means within a shaft
9 member to an inlet passage;

10 retracting of a piston within a cylinder to
11 allow an induction of air from the inlet passage
12 through said passage means into the cylinder;

13 rotating the shaft member to prevent any
14 leakage of air upon a compression of the air in the
15 cylinder by the piston;

16 combusting air/fuel mixture in the cylinder to
17 cause said piston to retract;

18 extending the piston in the cylinder;

19 presenting passage means to the cylinder and
20 an outlet passage to allow an egress of combusted
21 gases; and

22 repeating the above steps.
23

24 15. A method according to claim 14, in which the
25 same passage means is used for induction and egress.
26

27 16. A method according to claim 14, in which the
28 passage means is formed by an aperture in at least
29 one hollow shaft, and the method further includes
30 the step of varying the effective size of the
31 aperture to restrict or maximise the amount of fluid
32 flow through the aperture.